DAT405 Assignment 1 - Group 2

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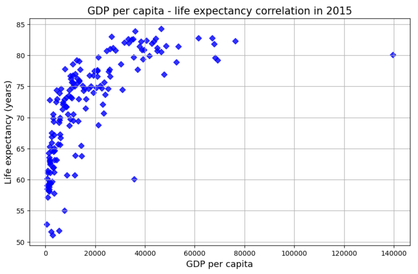
In [1]:
```
import pandas as pd
import seaborn as sns
import numpy as py
import matplotlib.pyplot as plt
from IPython.display import Markdown, display
```

Problem a)

In [2]:
```
# Upload data
life_exp = pd.read_csv('life-expectancy.csv')
GDPp_2015 = pd.read_csv('GDP-2015.csv')

# Life expectancy from year 2015 only
life_exp_2015 = life_exp.loc[(life_exp['Year'] == 2015) & (life_exp['Code'].str.len() == 3)]

# Merging 'life expectancy from 2015' and 'GDP' data on 'Code' column
common = pd.merge(life_exp_2015, GDPp_2015, on='Code')
```

Data is cleaned by only selecting the countries. In other words, we have removed continents and other that are not a country. This is done by selecting only rows that have three characters in the Code column since it is only countries that have a Code character length of 3.

In [3]:
```
# Plotting
plt.figure(figsize=(10,6))
plt.scatter(x=common['GDP per capita'], y=common['Life expectancy (years)'], c='blue', alpha=0.8, marker='D')

plt.xlabel('GDP per capita', fontsize=13)
plt.ylabel('Life expectancy (years)', fontsize=13)
plt.title('GDP per capita - life expectancy correlation in 2015', fontsize=15)

plt.grid(True)
plt.show()
```



Problem b)

In [4]:
```
le_mean = py.mean(common['Life expectancy (years)']) # Life expectancy mean
le_std = py.std(common['Life expectancy (years)']) # Life expectancy one standard deviation
age_above_mean_plus_std = le_mean + le_std

display(Markdown(f"The global mean life expectancy is **{le_mean:.1f}** years \
    with the standard deviation **{le_std:.1f}** years."))
display(Markdown(f"Age that is one standard deviation above the mean is **{age_above_mean_plus_std:.1f}** years."))
```

The global mean life expectancy is **71.8** years with the standard deviation **8.1** years.

Age that is one standard deviation above the mean is **79.9** years.

In [5]:
```
#Extracting: life expectancy > mean + 1std
table_highLe = life_exp_2015.loc[life_exp_2015['Life expectancy (years)'] > age_above_mean_plus_std]

table_title = "Countries with life expectancy higher than one SD above the mean"
display(Markdown(f"### {table_title}"))
display(table_highLe)
```

Countries with life expectancy higher than one SD above the mean

	Entity	Code	Year	Life expectancy (years)
508	Andorra	AND	2015	83.0
1136	Australia	AUS	2015	82.7
1218	Austria	AUT	2015	81.2
1832	Belgium	BEL	2015	80.9
2048	Bermuda	BMU	2015	80.9
3118	Canada	CAN	2015	81.9
4321	Cyprus	CYP	2015	81.0
4658	Denmark	DNK	2015	80.7
5935	Finland	FIN	2015	81.4
6141	France	FRA	2015	82.2
6285	French Polynesia	PYF	2015	82.4
6582	Germany	DEU	2015	80.6
6727	Gibraltar	GIB	2015	80.4
6814	Greece	GRC	2015	80.7
7030	Guadeloupe	GLP	2015	81.9
7252	Guernsey	GGY	2015	82.3
7690	Hong Kong	HKG	2015	84.3
7952	Iceland	ISL	2015	82.4
8334	Ireland	IRL	2015	81.4
8478	Israel	ISR	2015	82.1
8628	Italy	ITA	2015	82.5
8860	Japan	JPN	2015	83.9
8932	Jersey	JEY	2015	80.9
10386	Liechtenstein	LIE	2015	82.8
10581	Luxembourg	LUX	2015	81.8
10653	Macao	MAC	2015	84.0
11085	Malta	MLT	2015	83.0
11229	Martinique	MTQ	2015	82.2
11785	Monaco	MCO	2015	85.3
12678	Netherlands	NLD	2015	81.5
12824	New Zealand	NZL	2015	82.0
13589	Norway	NOR	2015	82.3
14481	Portugal	PRT	2015	81.2
14625	Qatar	QAT	2015	80.1
14697	Reunion	REU	2015	81.2
15588	San Marino	SMR	2015	82.9
16096	Singapore	SGP	2015	82.8
16315	Slovenia	SVN	2015	80.8
16683	South Korea	KOR	2015	82.6
16872	Spain	ESP	2015	82.6
17367	Sweden	SWE	2015	82.2
17513	Switzerland	CHE	2015	82.8
19078	United Kingdom	GBR	2015	80.9
19638	Vatican	VAT	2015	82.4

Problem c)

In [6]:
```
# Upload data
GDP = pd.read_csv('gross-domestic-product.csv')

# GDP from year 2015 and CODE length = 3
GDP_2015 = GDP.loc[(GDP['Year'] == 2015) & (GDP['Code'].str.len() == 3)]
```

Now, we are looking into GDP instead of GDP per capita.

Since the data is very skewed, we decided to use quartiles to define "high" and "low" instead of standard deviation. We have defined "high" life expectancy as the upper quartile and "low" GDP as the lower quartile. Then displayed the countries that fulfill both requirements.

In [7]:
```
GDP_LE = pd.merge(GDP_2015, life_exp_2015, on='Code')

q1_GDP = GDP['GDP'].quantile(0.25)
q3_LE = life_exp_2015['Life expectancy (years)'].quantile(0.75)

GDP_LE_table = GDP_LE[(GDP_LE['Life expectancy (years)'] > q3_LE) & (GDP_LE['GDP'] < q1_GDP)]
table_title = "Countries with high life expectancy (>Q3) and low GDP (<Q1)"
display(Markdown(f"### {table_title}"))
display(GDP_LE_table)
```

Countries with high life expectancy (>Q3) and low GDP (<Q1)

	Entity_x	Code	Year_x	GDP	Entity_y	Year_y	Life expectancy (years)
4	Andorra	AND	2015	2789870080	Andorra	2015	83.0
62	Faeroe Islands	FRO	2015	2518096384	Faeroe Islands	2015	79.7
160	San Marino	SMR	2015	1419394816	San Marino	2015	82.9

Problem d)

We have filtered countries that have strong economy, by GDP (upper quartile) and have not high life expectancy, by "not high" we mean below the upper quartile.

So, to answer the question, looking at the table below, we can see that there are many countries that have strong economy but don't have so high life expectancy.

In [8]:
```
q3_GDP = GDP['GDP'].quantile(0.75)
q3_LE = life_exp_2015['Life expectancy (years)'].quantile(0.75)

GDP_LE_table = GDP_LE[(GDP_LE['Life expectancy (years)'] < q3_LE) & (GDP_LE['GDP'] > q3_GDP)]
table_title = "Countries with strong economy (by GDP) (>Q3) and not high life expectancy (<Q3)"
display(Markdown(f"### {table_title}"))
display(GDP_LE_table)
```

Countries with strong economy (by GDP) (>Q3) and not high life expectancy (<Q3)

	Entity_x	Code	Year_x	GDP	Entity_y	Year_y	Life expectancy (years)
2	Algeria	DZA	2015	165979275264	Algeria	2015	75.6
7	Argentina	ARG	2015	594749292544	Argentina	2015	76.8
15	Bangladesh	BGD	2015	195078684672	Bangladesh	2015	70.5
26	Brazil	BRA	2015	1802211950592	Brazil	2015	74.3
39	China	CHN	2015	11061553004544	China	2015	77.0
40	Colombia	COL	2015	293481742336	Colombia	2015	76.3
56	Egypt	EGY	2015	329360568960	Egypt	2015	70.5
84	India	IND	2015	2103587766272	India	2015	69.6
85	Indonesia	IDN	2015	860854222848	Indonesia	2015	69.7
86	Iran	IRN	2015	384951484416	Iran	2015	75.1
87	Iraq	IRQ	2015	166774112256	Iraq	2015	69.4
95	Kazakhstan	KAZ	2015	184388435968	Kazakhstan	2015	70.7
112	Malaysia	MYS	2015	301354811392	Malaysia	2015	75.1
119	Mexico	MEX	2015	1171867566080	Mexico	2015	74.7
136	Nigeria	NGA	2015	486803308544	Nigeria	2015	51.8
141	Pakistan	PAK	2015	270556135424	Pakistan	2015	65.7
147	Peru	PER	2015	189805297664	Peru	2015	75.6
148	Philippines	PHL	2015	306446139392	Philippines	2015	71.3
149	Poland	POL	2015	477811900416	Poland	2015	77.4
153	Romania	ROU	2015	177729208320	Romania	2015	74.8
154	Russia	RUS	2015	1363481067520	Russia	2015	72.1
162	Saudi Arabia	SAU	2015	654269874176	Saudi Arabia	2015	76.9
173	South Africa	ZAF	2015	346709786624	South Africa	2015	63.9
185	Thailand	THA	2015	401296424960	Thailand	2015	77.7
191	Turkey	TUR	2015	864316686336	Turkey	2015	76.6
204	Vietnam	VNM	2015	193241104384	Vietnam	2015	73.9

Problem e)

We did the same as in problem d) but instead compared GDP per capita.

In [9]:
```
GDPp_LE = pd.merge(GDPp_2015, life_exp_2015, on='Code')

q3_GDPp = GDPp_2015['GDP per capita'].quantile(0.75)
q3_LE = life_exp_2015['Life expectancy (years)'].quantile(0.75)

GDPp_LE_table = GDPp_LE[(GDPp_LE['Life expectancy (years)'] < q3_LE) & (GDPp_LE['GDP per capita'] > q3_GDPp)]
table_title = "Countries with strong economy (per capita) (>Q3) and not high life expectancy (<Q3)"
display(Markdown(f"### {table_title}"))
display(GDPp_LE_table)
```

Countries with strong economy (per capita) (>Q3) and not high life expectancy (<Q3)

	Entity_x	Code	Year_x	GDP per capita	Entity_y	Year_y	Life expectancy (years)
47	Equatorial Guinea	GNQ	2015	35743	Equatorial Guinea	2015	60.1
112	Oman	OMN	2015	37096	Oman	2015	77.7
128	Saudi Arabia	SAU	2015	47737	Saudi Arabia	2015	76.9
134	Slovakia	SVK	2015	25896	Slovakia	2015	76.6
150	Trinidad and Tobago	TTO	2015	30892	Trinidad and Tobago	2015	74.5

Conclusion

Generelly we think that a high GDP correlates to a higher life expectancy. In d) we saw that there were a lot of countries with a high GDP and not so high life expectancy. However in e) when we looked at GDP per capita, there were fewer countries. This is because GDP per capita is more accurate since it takes into account the population size and hence give a better picture of the economic well being of a citizen.

The higher value you have as an individual the better quality of life, hence longer life.